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Paramphistomum cervi (Schrank, 1790) as the cause
of a serious disease in stags (*Cervus elaphus* L.)

Paramphistomum cervi (Schrank, 1790) przyczyną ciężkiego
schorzenia u jeleni (*Cervus elaphus* L.)

The parasitic disease of the cow caused by the trematode *Paramphistomum cervi* (Schrank, 1790) (*Paramphistomidae*) was diagnosed and described for the first time in Poland in 1952 by Zadura et Nieć.

Before the publication of the mentioned report the disease was in our country not diagnosed. It can be supposed, however, that the disease, although extremely rare, occurred in Poland. This may have been caused among others by the controversial opinion held by various authors on the pathogenicity of this parasite, particularly that of the mature forms. Among others Neumann (1892) regards this trematode as not pathogenic. Nieberle et Cohrs (1949) mention on the extremely rare occurrence of this trematode in cattle, buffalos, sheep, goats and stags and blame the parasite for causing serious inflammatory states of the rumen and reticulum.

In connection with the cited paper of Zadura et Nieć, special attention was turned on the possibility of the occurrence of the disease in cattle in our country and as a result of this Anczykowski et Chowaniec (1955) published a report on the outbreak of a mass invasion of *Paramphistomum cervi* in 1955 in village „O” in the Włodawa region. The author of the present paper assisted in the stating of the diagnosis of the disease.

That the disease is in our country not rare and that it can attack besides cattle also other animals both domesticated and wild living is proved by the fact that it was diagnosed also in a stag and doe at the age 2—3 years in 1958. The animals were hunted down on

the western terrains of Poland and were kept in an enclosure of the Region of the State Forests in Pionki near Koźienice.

The animals from the western terrains, 11 in number were fed during the hard winter and spring seasons with oats and hay without the addition of any food supplements. It was planned to give the animals freedom in a suitable season in order to acclimatize them to the surrounding State forests. The condition of the animals after their hunting down was mediocre.

The postmortem examination of the first four animals conducted by the local veterinary surgeon did not reveal the cause of the death of the animals. In connection with this the next two animals (the stag and doe) were directed on 5th of May, 1958 to the Department of Pathological Anatomy of the Veterinary Institute in Puławy to establish the diagnosis.

The postmortem examination of the carcasses conducted in the Department revealed:

External examination: rigor mortis still persistent, the carcass very emaciated, the hair lustreless, the visible mucous membranes of the external orifices of the body pale, the anal region contaminated with faeces.

Internal examination: the subcutaneous fatty tissue poorly developed, gelatinous swellings subpericardial, subepicardial and under the serous membrane of the aorta, degeneration of the heart muscle, numerous ecchymoses under the epicardium, acute inflammation of the mucous membrane of the rumen and reticulum, under the mucous membrane of the rumen the presence of macroscopically visible numerous knobs, the size up to the grain of wheat, oval in shape, undermining the mucous membrane and containing in their interior parasites (Phot. 1), which were submitted to parasitological examination and proved to be young forms of *Paramphistomum cervi*, haemorrhagic inflammation of the duodenum, catarrh of the mucous membrane of the jejunum, hyperaemia of the lungs, kidneys and liver. In the rumen, reticulum and duodenum there was an enormous number of *Paramphistomum cervi* fixed to the mucous membrane, protruding freely to their lumen and present also loosely in the alimentary tract contents. The parasites caused the serious inflammatory state of the mucous membrane of these sections of the alimentary tract.

From sections of the rumen, reticulum, duodenum, small intestine,

heart, lungs, liver and kidneys fixed in 5—10% solution of formalin histological preparates embedded in paraffin were made, 5—10 microns in thickness, stained with hematoxylin and eosin.

Histopathological examination of the mentioned sections of the internal organs of the stag and doe gave the following result:

The rumen: Under the thinned mucous membrane the presence of young forms of the parasites, penetrating into the muscular membrane and driving into the mucous membrane, which in many places is damaged (Phot. 2), and sometimes even completely destroyed (Phot 3).

The reticulum: The connective tissue of the mucous membrane in the area of the insertion of the trematode shows cellular infiltration, the epithelium of the papillae thinned, the superficial batches of the cells of the epithelium undergo atrophy.

The duodenum (pyloric area): The mucous membrane shows copious cellular infiltration. The cellular infiltration is formed mainly by lymphocytes, red blood corpuscles, numerous represented eosinocytes, particularly in the superficial layers, leukocytes neutrophilic, plasmatic cells and histiocytes. The superficial parts of the mucous membrane shows signs of degenerative changes, including their break down, which in some places extends fairly deep resulting in such areas in distinct destruction of the mucous membrane. The dilated glandular ducts are full with the glandular contents. In the submucous membrane of this section of the duodenum the cellular infiltration is relatively insignificant. The submucous membrane and the muscular layer show visible swelling.

The duodenum (central section): The mucous membrane is similarly to the pyloric part infiltrated with cells, but the cellular infiltration is here considerably less extensive. In the parts close to the base there was a cellular infiltration, which in some areas formed foci. This infiltration penetrates in some areas also to the submucous membrane. The wall of the intestine shows in this section swelling. In the muscular membrane and in the subserous membrane there are also cellular infiltrations of a mediocre intensity.

The small intestine: The mucous membrane of this section of the intestine shows a modest cellular infiltration. The cellular infiltrations penetrate here and there also into the submucous membrane.

The heart muscle: Signs of cloudy swelling, the separate muscle

fibres do not take up the stain well. In the intermuscular connective tissue there are scanty cellular infiltrations and small extravasations.

The lungs: In the first case foci of serous-cellular pneumonia and the presence of not numerous, 'single pulmonar nematodes, in the second case — hyperaemia and foci of atelectasis.

The liver: In both cases congestion.

The kidneys: Hyperaemia which includes mainly the glomeruli.

The fact of the finding of the young forms of *Paramphistomum cervi* under the mucous membrane of the rumen which in those areas is injured and sometimes even completely destroyed, is extremely interesting and may throw light on the course of the life cycle and on the developmental route of this parasite in the final host which in the given case is the stag. It should be mentioned that the phase of the developmental cycle of the discussed parasite in the definite host is a problem hitherto unsolved.

Bacteriological examinations of the internal organs of the stag and doe and the biological test on white mice conducted by the Diagnostic Department of the Veterinary Institute (Docent Dr. E. Grycz) gave negative results.

The cause of the disease and of the death of the two animals and most likely also of the 4 animals which died earlier and were not examined in the Institute was the strong invasion with *Paramphistomum cervi*. The invasion could cause atony of the rumen and in connection with it disturbances of digestion what was expressed on postmortem examination by serious lesions in the mucous membrane of the alimentary tract affected by the invasion. As the final result the invasion could cause intoxication in consequence of which there appeared the degeneration of the heart-muscle and subepicardial ecchymoses.

The present report as well as the previous reports of Zadura et Nieć and that of Anczykowski et Chowaniec corroborate opinions of Zurn et Simson (cited after Skrjabin et Schulc, 1937), Orlov (1953), Nieberle et Cohrs (1949) and Pande (1937) on the pathogenic properties of *Paramphistomum cervi* to the definite host, because the parasite is capable of causing serious inflammation of the intestines which can terminate fatally. The paper corroborates also the opinions of Skrjabin et Schulc (1937) Veinberg et Romanov (cited after Skrjabin et Schulc 1937), that the parasite causes morbid lesions in the rumen and reticulum in the area of the insertion of the mature parasite.

Such lesions remain not indifferent to the course and prognosis of the disease, particularly when the invasion is heavy and the defence mechanisms of the organism is weakened, especially as the nourishment is impoverished as was the case in the described animals.

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STRESZCZENIE

W roku 1958 odłowiono na ziemiach zachodnich jedenaście jeleni i łan i umieszczono je na okres zimowy w zagrodzie Rejonu Lasów Państwowych w Pionkach, pow. Kozienice. Zwierzęta te miały być wypuszczone na wolność w okolicznych lasach.

U pierwszych czterech padłych sztuk sekcja przeprowadzona przez miejscowego lekarza wet. nie ustaliła przyczyn choroby i padnięcia. U następnych padłych dwu sztuk (jelenia i łani) w wieku 2—3 lat przeprowadzono w Zakładzie Anatomii Patologicznej I. W.

w Puławach dokładne badania anatomo-patologiczne oraz badania histopatologiczne wycinków żwacza, czepca, dwunastnicy, jelita czczego, płuc, wątroby i nerek oraz badania bakteriologiczne i próbę biologiczną na białych myszkach. (Dokładny opis wyników w tekście angielskim).

Na uwagę zasługuje obecność młodocianych postaci *Paramphistomum cervi* pod błoną śluzową żwacza, która w tych miejscach jest uszkodzona, a czasem nawet zupełnie zniszczona. Obecność ta może rzucać pewne światło na przebieg cyklu i drogi rozwojowe tego pasożyta w żywicielu ostatecznym.

Badania autora potwierdzają słuszość poglądów o właściwościach chorobotwórczych *Paramphistomum cervi* u żywiciela ostatecznego, manifestujących się powstawaniem ciężkich zmian w odcinkach przewodu pokarmowego, dotkniętych masową inwazją, w następstwie których może dojść do zejścia śmiertelnego.

EXPLANATION OF PLATE

Phot. 1. A section of the wall of rumen of the stag. Visible knobs which undermine the mucous membrane. Young forms of *Paramphistomum cervi* in the interior of the knobs.

Phot. 2. Cross section of the wall of rumen of the stag. Visible the trematode and the thinned, undermined mucous membrane. 10 X

Phot. 3. Cross section of the wall of rumen of the stag. Close to the larva there is an absence of the mucous membrane which is destroyed. 10 X



